

## THE CONSTRUCTION OF SHIPS.

*The Design and Construction of Ships.* By Prof. J. H. Biles. Vol. i. *Calculations and Strength.* Pp. viii+423; 280 illustrations. (London: C. Griffin and Co., Ltd., 1908.) Price 25s. net.

THIS is the first of two volumes dealing with modern methods of procedure used in connection with the design and construction of ships. It embodies details of courses of instruction given to students of naval architecture during the seventeen years the author has occupied the chair of naval architecture in the University of Glasgow. That professorship was founded about twenty-five years ago by the generosity of Mrs. John Elder, widow of a celebrated marine engineer, and was the first attempt made in any British university to provide instruction in the science and practice of shipbuilding. The Admiralty had previously established schools of naval architecture, mainly for the purpose of training their own shipbuilding officers, and it is noteworthy that all the men who have held the Glasgow professorship, the late Dr. Elgar, Mr. Jenkins, and Prof. Biles, were originally trained for the Admiralty service, but quitted it for appointments in private establishments. All of them had attained eminence in the practice of their profession before becoming teachers; they continued their practice in the design and construction of ships during the period of their professorships. Students at Glasgow consequently have had the good fortune to be taught by men who themselves received a thorough scientific training at the outset of their careers, had maintained close touch with current practice, and were familiar with the latest advances and improvements in shipbuilding and marine engineering. That fact is apparent throughout the volume under review, and adds much to its value.

The book is described in the preface as primarily intended for young students, and this intention has been admirably fulfilled. The author also ventures to hope that "many who have been students and some who in their daily work are interested in the problems dealt with may find some assistance" from the perusal of its pages. This hope will undoubtedly be realised. The arrangement of the book is excellent, its style concise and clear. Detailed explanations are given of processes of calculation and methods of procedure, in a form which should suffice for the guidance of those desirous of making work of that nature the principal occupation of their lives. Many of the sections—including those containing illustrations of types of ships, details of tonnage laws, rules for freeboard, and other subjects—should prove of interest to all persons connected with shipping. The plates, diagrams, and other illustrations are numerous, and the book as a whole is well produced. The volume has its own index.

The author does not lay claim to much originality, although not a little original work done by himself has been embodied. The book is valuable also for its tabulated data, much of which is drawn from professional work done by the author, or placed at his disposal by other authorities.

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Growing as it has done out of courses of instruction given to students at Glasgow, the book has naturally taken a form which adapts it for use as a textbook for students generally. Consequently it should greatly assist teachers as well as students of naval architecture, and particularly those in Great Britain and the United States. For a long time there has been a need for such a book; and in saying so, no discredit is cast upon smaller and less expensive textbooks previously produced, largely with a view to use by less advanced students than those who follow complete university courses in naval architecture.

This volume is subdivided into three sections. In the first, methods of calculating areas, volumes, and positions of centres of gravity are dealt with. A full account is given of applications of descriptive geometry to the delineation of the forms of ships and of various parts of ship-structures. Descriptions of various types of ships employed for war and commerce are also given, and abundantly illustrated. The information is elaborate and up to date, as is indicated by the fact that it includes drawings of the *Dreadnought* and *Invincible* classes in the Royal Navy; particulars of the latest ocean-going destroyers and submarines; descriptions of many types of cargo and passenger steamers; and details of steam and sailing yachts.

The second section of the volume is devoted to ship calculations, and its scheme is comprehensive. It includes details of numerical methods, as well as interesting descriptions of mechanical integrators and integragraphs which have been devised in recent years for measuring areas, moments, and moments of inertia of plane curves. Naval architects have been largely assisted by these instruments, and the drudgery of numerical calculation has been greatly reduced. All classes of engineers, as well as many scientific men, will be interested in the descriptions given of the applications of these mechanical integrators to calculations for the displacements, positions of centres of buoyancy and metacentres of ships, and work connected with determining the conditions of stability.

The important subject of the strength of ships is one with which Prof. Biles has been much concerned, and it is treated exhaustively in the third section of the book. Investigations and experiments of a special character were carried out by a committee (of which he was a member) appointed by the Admiralty about six years ago after the loss of the torpedo-boat-destroyer *Cobra* in the North Sea. Prof. Biles and his assistants and students at Glasgow undertook a great mass of calculations for representative vessels on behalf of that committee, and also analysed the results of experiments made on a typical torpedo-boat-destroyer in order to determine her behaviour when subjected to exceptional longitudinal bending moments which produced sensible changes of form. Much of the information in regard to these experiments had been published by Prof. Biles in the Transactions of the Institution of Naval Architects, but it is brought together in the volume under review in a form which will be useful for reference, and which adds to the

interest of his general treatment of the strength of ships.

The book will be heartily welcomed by all connected with the design and construction of ships; the appearance of the second volume will be awaited with interest.

W. H. WHITE.

#### HEREDITY AND EDUCATION.

*Education and the Heredity Spectre.* By Dr. F. H. Hayward. Pp. xv+147. (London: Watts and Co., 1908.) Price 1s. net.

WHAT Mr. Bernard Shaw means when he says that "the bubble of heredity has been pricked" is that the theory that the moral characters acquired by an individual during his lifetime are transmitted to his descendants has been exploded. We are all, including the author of the book before us, pretty well agreed that this is so. It is not supported by the scanty evidence on this point which the biologist has collected. Nor need we grieve that it has gone. For, if it can be maintained that a belief in it was an incentive to virtue, it is equally certain that such a belief was an excuse for vice, as was clearly seen by a little girl who, when told by her nurse that if she was naughty her grandchildren would be naughty too, pointed out that, if that was true, the reason that she was naughty was that her grandmother had been.

The conclusion reached by Mr. Shaw as to the bearing of the pricking of the bubble on education is that "the vilest abortionist is he who attempts to mould a child's character." That reached by Mr. Hayward is the diametric opposite of this. He is a Herbartian. Herbart asked:—

"Does a human being bring with him into the world his future shape, or does he not? In respect to his body he doubtless does; but that is not our question. We speak of the mind, the character, the entire disposition."

And Herbart's and Mr. Hayward's answer is that he does not; and that, that being so, it is not merely legitimate, but desirable, to attempt to mould a child's character.

But before we proceed further we must make sure that we keep two questions, which are probably puzzling our mind at the same time, perfectly distinct. One is a question for the biologist, the other for the educationist. The one is, "Can a child's character be moulded?" the other, "Is it desirable to do it deliberately?" With regard to the former question, the answer given by Dr. Archdall Reid, who has devoted much thought to this point, is "Yes." According to Dr. Reid, all the attributes which distinguish a civilised man from a barbarian (the two terms are relative, of course) have been acquired by the former during his lifetime. If this is true, an English boy brought up from birth in a Zulu kraal will, when a man, have the morals and ideals of a Zulu. He will only differ from the other inhabitants of the kraal in having a paler skin and the other physical characters which distinguish the two races. Such experiments may have been made, but it is highly unlikely that they have been accurately recorded. The presence of anyone capable of doing so would spoil the conditions of the

experiment. But even if this view of the nature of our morality is correct, it does not follow that it is desirable to attempt to mould a child's character. It rather shows that we cannot help moulding it by everything that we do, and that any little deliberate attempts that we make will count for so little in comparison with what we have already done, and will go on doing, that they will not make much difference.

From the educational side the book is well worth reading, and the subject discussed is of first-rate importance; but our author is not a biologist either by sympathy or achievement. Was it worth while to poke fun at Mendel for his researches on green peas (p. 134)? People lay so much too much stress on the material that is dealt with in an investigation. Personally, we set more value on a man who discovers, not *everything*, as some Mendelians hold, but, say, "a rough quarter" by experiments "with green peas," than on one who discovers practically nothing by an excursus on man. We quote the whole passage:—

#### "(3) Mendelism.

"The question of heredity has entered on a new phase during the past ten years, owing to the unearthing of Mendel's researches on green peas. The plant again! We are to discover the laws of human nature by the study of heredity in non-conscious, non-moral plants."

Does Mr. Hayward really think that we investigate natural processes for the benefit of those who apply the information which we give them? The reason that Mr. Hayward dislikes the plant so is that, according to him, the non-Herbartian doctrine of education is based on what he calls the "plant" metaphor.

"The future form of a plant is admittedly determined in advance. True, there are 'variations' and 'mutations,' the laws of which we are likely, sooner or later, to know; true, also, *even plants*<sup>1</sup> are plastic in a measure, to environmental influences. Broadly, however, we may say that the fate of a plant is fixed by the nature of the germ from which it springs."

We quote this to show that Mr. Hayward's biology is shaky. For it is now generally recognised that one fundamental difference between animals and plants is the much greater susceptibility of the latter to environmental changes.

#### RECENT STUDIES IN ATMOSPHERIC ELECTRICITY.

*Die. Luftelektrizität. Methoden und Resultate der neueren Forschung.* By Prof. Albert Gockel. Pp. vi+206. (Leipzig: S. Hirzel, 1908.) Price 6 marks.

OF late years there has been great activity in this country in investigating electrical phenomena in gases and in advancing and discussing theories as to the nature and properties of ions. But this work has been mainly done in the laboratory or by mathematicians. In central Europe, thanks largely to the influence of Exner and of Elster and Geitel, there have been many workers studying the electrical phenomena presented by nature. Amongst them Prof. Gockel takes a distinguished place. In the present volume he gives an exceedingly up-to-date account of our knowledge of atmospheric electricity. The amount that has recently been written on the subject will

<sup>1</sup> The italics are ours.